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PATENT
AMENDED APPEAL BRIEF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Frederick Paul Benning et al. : Date: March 31, 2006

Serial No.: 09/976,167 : Art Unit: 1765

Confirmation No.: 1982 : Examiner: Shamim Ahmed

Filed: October 12, 2001

Title: SELF-CLEANING COLLOIDAL SLURRY
COMPOSITION AND PROCESS FOR FINISHING
A SURFACE OF A SUBSTRATE

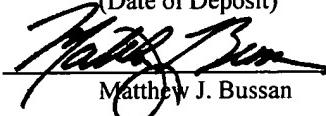
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Matthew J. Bussan

AMENDED APPEAL BRIEF IN SUPPORT OF APPEAL
FROM THE PRIMARY EXAMINER TO THE BOARD OF PATENT APPEALS

Applicant herewith submits an Amended Appeal Brief in support of the appeal to the Board of Patent Appeals and Interferences from the decision dated June 22, 2005, of the primary examiner finally rejecting claims 1, 3-18, 35 and 40-42. The Amended Appeal Brief is filed pursuant to the Notification of Non-Compliant Appeal Brief (37 CFR 41.37) mailed on March 9, 2006.

04/04/2006 FFANAI A2 00000012 090465 09976167

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Docket No.: ROC920010111US1

Serial No.: 09/976,167

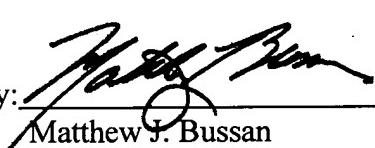
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If not already charged when the original appeal brief was filed on December 30, 2005, the appeal brief fee of \$500.00 is to be charged to Deposit Account No. **09-0465**. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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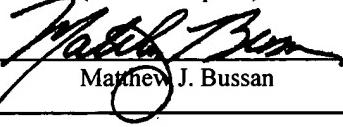
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Docket No.: ROC920010111US1
Serial No.: 09/976,167



PATENT
AMENDED APPEAL BRIEF

Table of Contents

(i) Real party in interest	5
(ii) Related appeals and interferences	6
(iii) Status of claims	7
(iv) Status of Amendments	8
(v) Summary of claimed subject matter	9
(vi) Grounds of rejection to be reviewed on appeal	13
(vii) Argument	14
A. Issue: Whether claims 1, 4-10, 13-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1)?	14
Independent claims 1 and 35 (Claim 35 separately argued below)	14
Independent claim 35	16
Dependent Claims 4-10 and 13-18 (Claims 7, 14, 15 and 16 argued separately below)	17
Dependent claim 7	18
Dependent claim 14	18
Dependent claim 15	19

Docket No.: ROC920010111US1

Serial No.: 09/976,167

PATENT
AMENDED APPEAL BRIEF

Table of Contents (Continued)

Dependent claim 16	19
B. Issue: Whether claim 40 is unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Burton et al. (U.S. Patent No. 6,083,838)?	20
C. Issue: Whether claims 41 and 42 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Roberts (U.S. Patent No. 5,723,181)?	21
Independent claim 41	22
Dependent Claim 42	24
D. Issue: Whether claims 1, 3-6, 8-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403)?	25
Independent claims 1 and 35 (Claim 35 argued separately below)	26
Independent claim 35	28
Dependent claims 3-6 and 8-18 (Claims 14, 15 and 16 argued separately below)	30
Dependent claim 14	30
Dependent claim 15	31
Dependent claim 16	31

PATENT
AMENDED APPEAL BRIEF

Table of Contents (Continued)

E. Issue: Whether claims 7 and 8 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403) and further in view of Small et al. (U.S. Patent No. 6,251,150)?	32
Dependent claims 7 and 8 (Claim 7 argued separately below) ..	32
Dependent claim 7	33
F. Conclusion to argument	34
(viii) Claims appendix	35
(ix) Evidence appendix	41
(x) Related proceedings appendix	42

PATENT
AMENDED APPEAL BRIEF

(i) Real party in interest

The real party in interest is International Business Machines Corporation; the inventors assigned their interest as recorded on October 12, 2001, on Reel 012256, Frame 0531.

PATENT
AMENDED APPEAL BRIEF

(ii) Related appeals and interferences

There are no known appeals, judicial proceedings or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

PATENT
AMENDED APPEAL BRIEF

(iii) Status of claims

Claims 1, 3-18, 35 and 40-42 are rejected. Claims 2, 19-34 and 36-39 are canceled.

Appeal is made to the Board of Patent Appeals and Interferences from the decision dated June 22, 2005 of the primary examiner finally rejecting claims 1, 3-18, 35 and 40-42. The claims on appeal are set forth in the Appendix I.

Claims 19-34 and 37-39 were canceled in the Response to Restriction Requirement filed on January 26, 2004. Claims 2 and 36 were canceled in the Amendment filed on April 11, 2005. The Advisory Action dated October 11, 2005 echoed the canceled status of these claims. Consequently, claims 2, 19-34 and 36-39 are not on appeal.

PATENT
AMENDED APPEAL BRIEF

(iv) Status of Amendments

The only amendment filed subsequent to the final rejection was acted on by the examiner. The Amendment after Final, which was filed on September 26, 2005, was apparently entered for purposes of Appeal as no indication to the contrary was provided on the Advisory Action.

PATENT
AMENDED APPEAL BRIEF

(v) Summary of claimed subject matter

As defined in each of the independent claims (i.e., claims 1, 35 and 41), the present invention is directed to a self-cleaning colloidal slurry composition for finishing a surface (i.e., “superfinishing” in claims 1 and 41, and “finishing” to provide a “textured surface” in claim 35) of a disk substrate. As defined in each of these independent claims, the disk substrate is selected from a group consisting of a glass disk substrate, a ceramic disk substrate, and a glass-ceramic disk substrate for use in a data storage device. Also, as defined in each of these independent claims, the self-cleaning colloidal slurry comprises a carrying fluid, colloidal particles, etchant for etching the substrate, and a surfactant on (i.e., “adsorbed and/or precipitated onto” in claims 1 and 35, and “precipitated onto” in claim 41) a surface of at least one of the substrate and the colloidal particles, the surfactant having a hydrophobic section that forms a steric hindrance barrier between the substrate and the colloidal particles. See, for example, the discussion at page 9, line 16 - page 10, line 10 of the specification.

The invention is best understood against the backdrop of understanding conventional superfinishing polish processes and slurries, and the problems associated therewith. See, for example, the discussion at page 4, lines 1-19 of the specification. In the conventional superfinishing polish process and slurry of the Hartog et al. patent (U.S. Patent No. 6,236,542), for example, colloidal silica particles attach to the surface being polished not only by the usual London dispersion forces, van der Waals forces and hydrogen bonding, but unlike NiP, also by molecular bonding. Standard methods of scrubbing with soaps using polyvinyl alcohol (PVA) pads, ultrasonics or megasonics will not remove any significant percentage of such molecular bonded silica particles. When used in conjunction with the superfinishing polish process and slurry of the Hartog et al. patent, such conventional soap-based cleaning processes leave residual slurry material

PATENT
AMENDED APPEAL BRIEF

that must be removed from the surface of the disk substrates by a further cleaning mechanism (i.e., etching, micropolishing or polish etch). If these particles are left in place on the glass substrate, glide defects occur that can ultimately cause disk drive failure. These glide defects further cause magnetic defects, corrosion and decreased disk life. However, when used in conjunction with the self-cleaning colloidal slurry of the present invention, such conventional soap-based cleaning processes completely remove the remaining slurry material leaving the surface of the disk substrates free from contamination. See, for example, the discussion at page 17, lines 1-11 of the specification.

The existence of the steric hindrance barrier in the superfinishing polish slurry goes to the heart of the present invention -- the steric hindrance barrier prevents the colloidal particles from ever bonding to the surface of disk substrate in the first place and permits removal of substantially all of the remaining contamination from the surface of the substrate using standard soap solutions. The steric hindrance barrier takes away molecular bonding, acid/base bonding, hydrogen bonding, and some or all of the van der Walls forces (amount depends on the surfactant composition and structure chosen) for the colloidal particles sticking to the surface of disk substrate. This allows conventional soap-based cleaning of disk substrates and removes the requirement for special and expensive extra cleaning steps, such as etching (undercutting) or micropolishing or polish etch, or combinations thereof. See, for example, the discussion at page 9, line - page 10, line 10 and page 22, lines 6-17 of the specification.

Another aspect of the invention, as defined in independent claim 35, is that the colloidal particles have a nominal size of approximately 70 - 200 nm to provide a textured surface on the disk substrate. See, for example, the discussion at page 8, lines

PATENT
AMENDED APPEAL BRIEF

11-15 of the specification. Texturing provides a circumferential texture pattern on the surface of the disk substrate that improves the magnetic characteristics of the magnetic data storage disk fabricated from the substrate. See, for example, the discussion at page 31, lines 7-13 of the specification.

In yet another aspect of the invention, as defined in dependent claim 7, the colloidal particles include colloidal silica particles, the surfactant is a cationic quaternary amine surfactant, and the self-cleaning colloidal slurry composition has a pH of approximately 7 to 12. See, for example, the discussion at page 20, lines 2-6 of the specification.

In still yet another aspect of the invention, as defined in dependent claim 14, the surfactant is a nonionic, oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol. See, for example, the discussion at page 22, lines 18-23 of the specification.

In another aspect of the invention, as defined in dependent claim 15, the surfactant is a nonionic and/or cationic, nitrogen containing compound selected from a group consisting of alkaloids and amines, and combinations thereof. See, for example, the discussion at page 22, lines 18-23 and page 23, lines 9-13 of the specification.

In yet another aspect of the invention, as defined in dependent claim 16, the surfactant is a nonionic and/or cationic, polydentate adsorption surfactant. See, for example, the discussion at page 22, lines 18-23 of the specification.

PATENT
AMENDED APPEAL BRIEF

In still yet another aspect of the invention, as defined in dependent claim 40, the surfactant is a nonionic, ethylene oxide propylene oxide block copolymer. See, for example, the discussion at page 22, lines 18-23 and page 23, lines 19-23 of the specification.

In another aspect of the invention, as defined in dependent claim 42, the surfactant is sodium octyl sulfate. See, for example, the discussion at page 22, line 24 - page 23, line 2 of the specification.

PATENT
AMENDED APPEAL BRIEF

(vi) Grounds of rejection to be reviewed on appeal

- A. Whether claims 1, 4-10, 13-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1)?
- B. Whether claim 40 is unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Burton et al. (U.S. Patent No. 6,083,838)?
- C. Whether claims 41 and 42 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Roberts (U.S. Patent No. 5,723,181)?
- D. Whether claims 1, 3-6, 8-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403)?
- E. Whether claims 7 and 8 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403) and further in view of Small et al. (U.S. Patent No. 6,251,150)?

PATENT
AMENDED APPEAL BRIEF

(vii) Argument

A. Issue: Whether claims 1, 4-10, 13-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1)?

Claims 1, 4-10, 13-18 and 35 are rejected under 35 U.S.C. 103(a) as unpatentable over Ma et al.

The appellant respectfully submits that the Ma et al. reference fails to disclose or suggest the invention as recited in claims 1, 4-10, 13-18 and 35 and requests reversal of the rejection under 35 U.S.C. 103(a).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations. See, MPEP § 2143. The appellant respectfully submits that these basic criteria are lacking in this rejection.

Independent claims 1 and 35 (Claim 35 separately argued below)

Independent claims 1 and 35 require specific interaction between a surfactant and a substrate that is a glass disk substrate, a ceramic disk substrate, or a glass-ceramic disk substrate for use in a data storage device. With respect to claims 1 and 35, the specific interaction claimed is that the surfactant is adsorbed and/or precipitated onto a surface of

PATENT
AMENDED APPEAL BRIEF

at least one of the substrate and the colloidal particles, and that the surfactant has a hydrophobic section that forms a steric hindrance barrier between the substrate and the colloidal particles. The Ma et al. reference fails to disclose or suggest using its chemical mechanical polishing slurry composition and method in the context of providing the specific interaction claimed during superfinishing a surface of a glass disk substrate, a ceramic disk substrate, or a glass-ceramic disk substrate for use in a data storage device (claim 1); or finishing to provide a textured surface on a glass disk substrate, a ceramic disk substrate, or a glass-ceramic disk substrate for use in a data storage device (claim 35). Instead, the Ma et al. reference discloses its chemical mechanical polishing compositions in the context of polishing semiconductor devices.

In this regard, the final Office Action states, “the intended use is not given patentable weight, as the composition is capable of doing so.” See, final Office Action, page 2, item 1, lines 12-14. It is, however, impermissible to ignore claim limitations. See, MPEP 2143.03. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

In the “Continuation Sheet” of the Advisory Action dated October 11, 2005, the examiner states, “a recitation directed to the manner in which a claimed composition is intended to be used does not distinguish the claimed composition from the prior art if the prior art has the capability to perform the same function.” (Emphasis added.) However, the appellant respectfully submits that the specific interaction claimed does not necessarily follow from the chemical mechanical polishing compositions disclosed in the Ma et al. reference. In other words, the condition by which the intended use is not given

PATENT
AMENDED APPEAL BRIEF

patentable weight, i.e., the prior art has the capability to perform the same function, is not met. The specific interaction claimed is not met not only because the substrate is different (i.e., semiconductor, instead of disk substrate) as discussed above, but also because the composition is different. Independent claims 1 and 35 require the composition to comprise both a surfactant and colloidal particles. However, the Ma et al. reference does not disclose or suggest the use of a surfactant with colloidal particles (its second-step slurry), but only with organic polymeric abrasive (its first-step slurry). See, Ma et al., page 5, paragraphs 0060-0062 and page 6, paragraphs 0068-0072. It is unjustifiable to interpret the organic polymer abrasive in the Ma et al. reference's first-step slurry as colloidal, as the examiner has done in the "Continuation Sheet" of the Advisory Action dated October 11, 2005, when the Ma et al. reference itself characterizes only its second-step slurry as containing colloidal particles.

Independent claim 35

In addition, independent claim 35 requires that the colloidal particles have a specified nominal size to provide a textured surface on a disk substrate for use in a data storage device. Texturing is not taught in the Ma et al. reference. The specified nominal size of the colloidal particles (i.e., 70-200 nm) set forth in claim 35 is different than that (i.e., 3-70 nm) taught in the Ma et al. reference. See, Ma et al., page 6, paragraph 0071. Moreover, the colloidal particle teaching of the Ma et al. reference is in the context of polishing a semiconductor wafer -- not texturing a disk substrate. The Ma et al. reference teaches, "[c]olloidal silica, with a narrow size distribution, minimizes scratch defects and provides superior removal rates on barrier materials, greater than 1000A/min, and low removal rates for copper and barrier." See, Ma et al., page 6, paragraph 0072. Thus, the

PATENT
AMENDED APPEAL BRIEF

Ma et al. reference teaches away from the claimed nominal size of the colloidal particles necessary to provide a textured surface on a disk substrate.

The teaching or suggestion to make the claimed modification and the reasonable expectation of success must be found in the prior art, not applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). With regard to each of the independent claims, the appellant respectfully submits that the teaching or suggestion to make the claimed modification and the reasonable expectation of success are based on impermissible hindsight gleaned from the appellant's disclosure, not the prior art. It is improper to use the inventor's patent application as an instruction book on how to reconstruct the prior art. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1 USPQ2d 1593 (Fed. Cir. 1987).

Dependent Claims 4-10 and 13-18 (Claims 7, 14, 15 and 16 argued separately below)

Claims 4-10, 13-18 depend, directly or indirectly, from independent claim 1. The appellant respectfully submits that the Ma et al. reference cannot render unpatentable these dependent claims for at least the reasons discussed above with respect to independent claim 1.

In addition, several of these dependent claims recite specific surfactants that are not disclosed or suggested in the Ma et al. reference. Granted, the Ma et al. reference states “[t]he surfactant may be cationic or anionic.” See, Ma et al., page 5, paragraph 0060. However, the disclosure of these broad surfactant categories in the Ma et al. reference does not provide sufficient specificity to lead to the specific surfactants claimed in claims 7, 14, 15 and 16. Moreover, none of the example surfactants given in the Ma et

PATENT
AMENDED APPEAL BRIEF

al. reference are those, or even reasonably suggest those, specifically claimed in claims 7, 14, 15 and 16.

Dependent claim 7

As defined in dependent claim 7, the colloidal particles include colloidal silica particles, the surfactant is a cationic quaternary amine surfactant, and the self-cleaning colloidal slurry composition has a pH of approximately 7 to 12. See, for example, the discussion at page 20, lines 2-6 of the specification. Hence, claim 7 requires a specific combination of colloidal silica particles, cationic quaternary amine surfactant, and pH. The Ma et al. reference fails to disclose or suggest a cationic quaternary amine surfactant, alone, much less in the context of the claimed combination.

Dependent claim 14

As defined in dependent claim 14, the surfactant is a nonionic, oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol. See, for example, the discussion at page 22, lines 18-23 of the specification. See also, the discussion at page 23, line 3 - page 24, line 26 of the specification and Table 3 on page 25 of the specification. Please note that only a few of the many commercially available surfactants listed in Table 3 are effective, i.e., effective surfactants are indicated with "Beads Off". Two of the effective surfactants listed in Table 3 are oxygen containing compounds with moieties of ethylene oxide or polyvinyl alcohol (i.e., Corsheen CorAdd 9192LF and Glycol). Hence, claim 14 requires the surfactant to be an oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol. The Ma et al. reference fails to

PATENT
AMENDED APPEAL BRIEF

disclose or suggest a surfactant that is an oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol.

Dependent claim 15

As defined in dependent claim 15, the surfactant is a nonionic and/or cationic, nitrogen containing compound selected from a group consisting of alkaloids and amines, and combinations thereof. See, for example, the discussion in the specification at page 22, lines 18-23 and at page 23, line 3 - page 24, line 26, as well as Table 3 on page 25 in the specification. Please note that only a few of the many commercially available surfactants listed in Table 3 are effective, i.e., effective surfactants are indicated with "Beads Off". One of the effective surfactants listed in Table 3 has amine groups (i.e., SOLSPERSE 2000). Another effective surfactant discussed at page 23, lines 19-23 of the specification has an alkaloid component (i.e., Corsheen CorAdd 9195). Hence, claim 15 requires the surfactant to be selected from a group consisting of alkaloids and amines, and combinations thereof. The Ma et al. reference fails to disclose or suggest a surfactant that is selected from a group consisting of alkaloids and amines, and combinations thereof.

Dependent claim 16

As defined in dependent claim 16, the surfactant is a nonionic and/or cationic, polydentate adsorption surfactant. See, for example, the discussion at page 22, lines 18-23 of the specification. The Ma et al. reference fails to disclose or suggest a surfactant that is a polydentate adsorption surfactant.

PATENT
AMENDED APPEAL BRIEF

B. Issue: Whether claim 40 is unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Burton et al. (U.S. Patent No. 6,083,838)?

Claim 40 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ma et al. in view of Burton et al.

The appellant respectfully submits that the Ma et al. and Burton et al. references, alone and in combination, fail to disclose or suggest the invention as recited in claim 40 and requests reversal of the rejection under 35 U.S.C. 103(a).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations. See, MPEP § 2143. The appellant respectfully submits that these basic criteria are lacking in this rejection.

Claim 40 depends indirectly from independent claim 1. The appellant respectfully submits that the Ma et al. and Burton et al references, alone and in combination, cannot render unpatentable this dependent claim for at least the reasons discussed above with respect to independent claim 1 because the Burton et al. reference fails to cure the deficiencies in the Ma et al. reference. The Burton et al. reference is cited for allegedly teaching “a CMP slurry composition containing abrasive and a surfactant is used to increase the polishing capability by increasing the viscosity of the slurry, wherein the

PATENT
AMENDED APPEAL BRIEF

surfactant is propylene oxide-ethylene oxide block copolymer (col. 3, lines 62-65 and col. 4, line 64 - col. 5, line 9).” However, in the Burton et al. reference, as in the Ma et al. reference, both the substrate and the CMP composition are different than those recited in independent claim 1. With respect to the former, the Burton et al. reference discloses a semiconductor wafer, rather than a disk substrate. With respect to the latter, the Burton et al. reference discloses an abrasive, rather than colloidal particles.

In addition, claim 40 requires the surfactant to be an ethylene oxide propylene oxide block copolymer. The Ma et al. reference fails to disclose or suggest a surfactant that is an ethylene oxide propylene oxide block copolymer. While the Burton et al. patent discloses such a surfactant, there is no motivation to modify the references as suggested by the examiner and no reasonable expectation of success found in the prior art.

C. Issue: Whether claims 41 and 42 are unpatentable under 35 U.S.C. §103(a) over Ma et al. (U.S. Patent Application Publication US 2003/0079416 A1) in view of Roberts (U.S. Patent No. 5,723,181)?

Claims 41 and 42 are rejected under 35 U.S.C. 103(a) as unpatentable over Ma et al. in view of Roberts.

The appellant respectfully submits that the Ma et al. and Roberts references, alone and in combination, fail to disclose or suggest the invention as recited in claims 41 and 42 and requests reversal of the rejection under 35 U.S.C. 103(a).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or

PATENT
AMENDED APPEAL BRIEF

in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations. See, MPEP § 2143. The appellant respectfully submits that these basic criteria are lacking in this rejection.

Independent claim 41

Independent claim 41 requires specific interaction between a surfactant and a substrate that is a glass disk substrate, a ceramic disk substrate, or a glass-ceramic disk substrate for use in a data storage device. The specific interaction claimed is that the surfactant is precipitated onto a surface of at least one of the substrate and the colloidal particles, and that the surfactant has a hydrophobic section that forms a steric hindrance barrier between the substrate and the colloidal particles. The Ma et al. reference fails to disclose or suggest using its chemical mechanical polishing slurry composition and method in the context of superfinishing a surface of a glass disk substrate, a ceramic disk substrate, or a glass-ceramic disk substrate for use in a data storage disk. Instead, the Ma et al. reference discloses its chemical mechanical polishing compositions in the context of polishing semiconductor devices.

In this regard, the final Office Action states, “the intended use is not given patentable weight, as the composition is capable of doing so.” See, final Office Action, page 2, item 1, lines 12-14. It is, however, impermissible to ignore claim limitations. See, MPEP 2143.03. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ

PATENT
AMENDED APPEAL BRIEF

580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

In the “Continuation Sheet” of the Advisory Action dated October 11, 2005, the examiner states, “a recitation directed to the manner in which a claimed composition is intended to be used does not distinguish the claimed composition from the prior art if the prior art has the capability to perform the same function.” (Emphasis added.) However, the appellant respectfully submits that the specific interaction claimed does not necessarily follow from the chemical mechanical polishing compositions disclosed in the Ma et al. reference. In other words, the condition by which the intended use is not given patentable weight, i.e., the prior art has the capability to perform the same function, is not met. The specific interaction claimed is not met not only because the substrate is different (i.e., semiconductor, instead of disk substrate) as discussed above, but also because the composition is different. Independent claim 41 requires the composition to comprise both a surfactant and colloidal particles. However, the Ma et al. reference does not disclose or suggest the use of a surfactant with colloidal particles (its second-step slurry), but only with organic polymeric abrasive (its first-step slurry). See, Ma et al., page 5, paragraphs 0060-0062 and page 6, paragraphs 0068-0072. It is unjustifiable to interpret the organic polymer abrasive in the Ma et al. reference’s first-step slurry as colloidal, as the examiner has done in the “Continuation Sheet” of the Advisory Action dated October 11, 2005, when the Ma et al. reference itself characterizes only its second-step slurry as containing colloidal particles.

Also, independent claim 41 requires the surfactant to be precipitated on a surface of the substrate and/or colloidal particles. The Ma et al. reference does not disclose or suggest that the surfactant is precipitated on a surface of the substrate and/or colloidal

PATENT
AMENDED APPEAL BRIEF

particles. The Roberts reference does not cure this or other deficiencies in the Ma et al. reference discussed above. The Roberts reference is cited for its alleged teaching that “surfactant such as sodium octyl sulfate is used in a colloidal silica composition for changing the surface chemistry and resulted surface is more susceptible to the surface processing (col. 1, lines 49-60 and col. 2, lines 46-53).”

The teaching or suggestion to make the claimed modification and the reasonable expectation of success must be found in the prior art, not applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). With regard to independent claim 41, the appellant respectfully submits that the teaching or suggestion to make the claimed modification and the reasonable expectation of success are based on impermissible hindsight gleaned from the appellant’s disclosure, not the prior art. It is improper to use the inventor’s patent application as an instruction book on how to reconstruct the prior art. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1 USPQ2d 1593 (Fed. Cir. 1987).

Dependent Claim 42

Claim 42 depends from claim 41. The appellant respectfully submits that the Ma et al. and Roberts references, alone and in combination, cannot render unpatentable this dependent claim for at least the reasons discussed above with respect to claim 41.

In addition, dependent claim 42 requires the surfactant precipitated onto a surface of at least one of the disk substrate and the colloidal particles to be sodium octyl sulfate. The Ma et al. reference does not disclose or suggest using sodium octyl sulfate as the surfactant. While the Roberts reference discloses the use of sodium octyl sulfate as a

PATENT
AMENDED APPEAL BRIEF

surfactant, it does not disclose or suggest that the sodium octyl sulfate surfactant is precipitated onto a surface of at least one of the disk substrate and the colloidal particles. Moreover, there is no motivation to modify the references as suggested by the examiner and no reasonable expectation of success found in the prior art.

D. Issue: Whether claims 1, 3-6, 8-18 and 35 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403)?

Claims 1, 3-6, 8-18 and 35 are rejected under 35 U.S.C. 103(a) as unpatentable over Hartog et al. in view of Kramer et al.

The appellant respectfully submits that the Hartog et al. and Kramer et al. references, alone and in combination, fail to disclose or suggest the invention as recited in claims 1, 3-6, 8-18 and 35 and requests reversal of the rejection under 35 U.S.C. 103(a).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations. See, MPEP § 2143. The appellant respectfully submits that these basic criteria are lacking in this rejection.

As discussed below, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to

PATENT
AMENDED APPEAL BRIEF

modify the primary reference to Hartog et al. or to combine the reference teachings as suggested by the Examiner. Moreover, as discussed below, there was no reasonable expectation of success in modifying the primary reference to Hartog et al. or combining the reference teachings as suggested by the Examiner.

Independent claims 1 and 35 (Claim 35 argued separately below)

The Hartog et al. patent fails to disclose or suggest a self-cleaning colloidal slurry composition having the specific interaction with a substrate recited in independent claims 1 and 35. The specific interaction claimed is “a surfactant adsorbed and/or precipitated onto a surface of at least one of the substrate and the colloidal particles, the surfactant having a hydrophobic section that forms a steric hindrance barrier between the substrate and the colloidal particles”.

In the final Office Action, the Examiner admits to this deficiency in the primary reference to Hartog et al. stating, “Hartog et al fail to teach the composition comprises a surfactant that forms a steric hindrance barrier between the substrate and the colloidal particles.” In the final Office Action, the Examiner indicates that this deficiency in the primary reference to Hartog et al. is cured by the secondary reference to Kramer et al. However, the appellant respectfully disagrees.

There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the primary reference to Hartog et al. or to combine the reference teachings as suggested by the Examiner. The teachings of the Kramer et al. patent referred to by the Examiner are in the context of a reduction of surface roughness of semiconductor wafers in the

PATENT
AMENDED APPEAL BRIEF

manufacturing of integrated circuits and other electronic devices. See, Kramer et al., col. 1, lines 14-18 and col. 1, lines 21-28. The teachings of the Kramer et al. reference are not in the context of providing the specific interaction claimed during superfinishing a surface of a disk substrate for use in a data storage device (claim 1) or finishing to provide a textured surface on a disk substrate for use in a data storage device (claim 35). It would not have been obvious to one of ordinary skill in the art to apply teachings of the Kramer et al. patent relating to reduction of surface roughness of semiconductor wafers to the superfinishing polish slurry described in the Hartog et al. patent.

In the final Office Action, the Examiner states, “However, Kramer et al disclose a polishing composition including silica abrasive and surfactant, wherein the surfactant forming particle barrier layer or flow modifiers to reduce roughening on the polished surface in order to reduce scratches and eventually cracking on the polished surface and the reduction of cracking decreases access of cleaning chemistry to underlying structures of the substrate (col.2, lines 1-5 and lines 53-57 and col. 3, lines 13-21 and col. 4, line 66 - col. 5, line 12 and col. 6, lines 55-67).” See, final Office Action, page 4-5, item 5, lines 10-15. There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 47 USPQ2d 1453, 1457-57 (Fed. Cir. 1998). Here, none of the three possible sources for motivation are present. The examiner appears to be relying on the first possible source for motivation when he states in the “Continuation Sheet” of the Advisory Action dated October 11, 2005, “applicant’s argument that Kramer et al.’s surfactant is used for different purpose does not alter the conclusion that its use in a prior art device would be *prima facie* obvious for the purpose disclosed in the reference.” With regard to the first possible source for a motivation, it is important to note that the nature of the problem to be solved (i.e., purpose) in the Kramer

PATENT
AMENDED APPEAL BRIEF

et al. patent by the use of its surfactant. The Kramer et al. patent's teachings are in the context of overcoming a "wormholing" problem that is not presented in the processing of disk substrates. See, Kramer et al., col. 1, line 57 - col. 2, line 9. According to the Kramer et al. patent, "wormholing" can provide channeling of subsequent cleaning chemistries, such as Tetra Methyl Ammonia Hydroxide (TMAH), to underlying metal structures, thus creating metal voids in the integrated circuit. In contrast to semiconductor wafers, disk substrates have no such underlying integrated circuit metal structures in which metal voids may be undesirably formed through "wormholing". It would not have been obvious to one of ordinary skill in the art to apply teachings of the Kramer et al. patent relating to a solution for overcoming the problem of "wormholing" in processing semiconductor wafers to the superfinishing polish slurry described in the Hartog et al. patent for processing disk substrates where "wormholing" is not a problem. Clearly, the nature of the problem to be solved does not provide a source for a motivation to combine references in this case.

Independent claim 35

Moreover, independent claim 35 requires that the colloidal particles have a specified nominal size to provide a textured surface on a disk substrate for use in a data storage device. Texturing is not taught in either the Hartog et al. patent or the Kramer et al. patent. Although the specified nominal size of the colloidal particles (i.e., 70-200 nm) set forth in claim 35 is included in the broad colloidal particle size (i.e., 1-1000 nm) teaching of the Hartog et al. patent, the broad colloidal particle teaching of the Hartog et al. patent is in the context of superfinishing -- not texturing. The teachings of the Kramer et al. patent, which relate to reduction of surface roughness, would lead one of ordinary skill in the art away from providing a textured surface on a disk substrate. Contrary to the

PATENT
AMENDED APPEAL BRIEF

inference drawn by the examiner in the “Continuation Sheet” of the Advisory Action dated October 11, 2005, the use of colloidal particles having a nominal size of approximately 70 - 200 nm to provide a textured surface on the substrate is not disclosed or suggested merely “because any polishing with abrasive will lead to a surface with certain texturing on the polished surface and furthermore, Kramer et al do not teach the reduction of surface roughness up to a ultra smooth surface without any texture on the surface.” It is unjustifiable to say that references directed to superfinishing and reduction of surface roughness somehow teach the opposite, i.e., texturing. Texturing is mentioned nowhere in either the Hartog et al. reference or the Kramer et al. reference. Texturing in the context of finishing disk substrates is important because it provides a circumferential texture pattern on the surface of the disk substrate that improves the magnetic characteristics of the magnetic data storage disk fabricated from the substrate. See, for example, the discussion at page 31, lines 7-13 of the specification.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art, not applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Applicants respectfully submit that the teaching or suggestion to make the claimed combination and the reasonable expectation of success are based on impermissible hindsight gleaned from the applicant’s disclosure, not the prior art. It is improper to use the inventor’s patent application as an instruction book on how to reconstruct the prior art. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1 USPQ2d 1593 (Fed. Cir. 1987).

PATENT
AMENDED APPEAL BRIEF

Dependent claims 3-6 and 8-18 (Claims 14, 15 and 16 argued separately below)

Claims 3-6 and 8-18 depend, directly or indirectly, from independent claim 1. The appellant respectfully submits that the Hartog et al. and Kramer et al. patents, alone and in combination, cannot render unpatentable these dependent claims for at least the reasons discussed above with respect to independent claim 1.

In addition, several of these dependent claims recite specific surfactants that are not disclosed or suggested in the Hartog et al. and Kramer et al. references, alone and in combination.

Dependent claim 14

As defined in dependent claim 14, the surfactant is a nonionic, oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol. See, for example, the discussion at page 22, lines 18-23 of the specification. See also, the discussion at page 23, line 3 - page 24, line 26 of the specification and Table 3 on page 25 of the specification. Please note that only a few of the many commercially available surfactants listed in Table 3 are effective, i.e., effective surfactants are indicated with "Beads Off". Two of the effective surfactants listed in Table 3 are oxygen containing compounds with moieties of ethylene oxide or polyvinyl alcohol (i.e., Corsheen CorAdd 9192LF and Glycol). Hence, claim 14 requires the surfactant to be an oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol. The cited art, including the Kramer et al. patent, fails to disclose or suggest a surfactant that is an oxygen containing compound with moieties of ethylene oxide and/or polyvinyl alcohol.

PATENT
AMENDED APPEAL BRIEF

Dependent claim 15

As defined in dependent claim 15, the surfactant is a nonionic and/or cationic, nitrogen containing compound selected from a group consisting of alkaloids and amines, and combinations thereof. See, for example, the discussion in the specification at page 22, lines 18-23 and at page 23, line 3 - page 24, line 26, as well as Table 3 on page 25 of the specification. Please note that only a few of the many commercially available surfactants listed in Table 3 are effective, i.e., effective surfactants are indicated with "Beads Off". One of the effective surfactants listed in Table 3 has amine groups (i.e., SOLSPERSE 2000). Another effective surfactant discussed at page 23, lines 19-23 of the specification has an alkaloid component (i.e., Corsheen CorAdd 9195). Hence, claim 15 requires the surfactant to be selected from a group consisting of alkaloids and amines, and combinations thereof. The cited art, including the Kramer et al. patent, fails to disclose or suggest a surfactant that is selected from a group consisting of alkaloids and amines, and combinations thereof.

Dependent claim 16

As defined in dependent claim 16, the surfactant is a nonionic and/or cationic, polydentate adsorption surfactant. See, for example, the discussion at page 22, lines 18-23 of the specification. The cited art, including the Kramer et al. patent, fails to disclose or suggest a surfactant that is a polydentate adsorption surfactant.

PATENT
AMENDED APPEAL BRIEF

E. Issue: Whether claims 7 and 8 are unpatentable under 35 U.S.C. §103(a) over Hartog et al. (U.S. Patent No. 6,236,542) in view of Kramer et al. (U.S. Patent No. 6,630,403) and further in view of Small et al. (U.S. Patent No. 6,251,150)?

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as unpatentable over Hartog et al. in view of Kramer et al. and further in view of Small et al.

The appellant respectfully submits that the Hartog et al., Kramer et al. and Small et al. references, alone and in combination, fail to disclose or suggest the invention as recited in claims 7 and 8 and requests reversal of the rejection under 35 U.S.C. 103(a).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations. See, MPEP § 2143. The appellant respectfully submits that these basic criteria are lacking in this rejection.

Dependent claims 7 and 8 (Claim 7 argued separately below)

Claims 7 and 8 depend directly from independent claim 1. The appellant respectfully submits that the Hartog et al., Kramer et al. and Small et al. references, alone and in combination, cannot render unpatentable these dependent claims for at least the reasons discussed above with respect to independent claim 1 because the Small et al. reference fails to cure the deficiencies in the Hartog et al. and Kramer et al. references.

PATENT
AMENDED APPEAL BRIEF

The Small et al. patent is cited for allegedly teaching “a composition comprises colloidal particles of silica or alumina (aluminum oxide) having a pH of about 3.8 - 9.4 for maintaining the zeta potential of the slurry composition in order clean or remove the residue efficiently (col. 10, lines 8-15, col. 10, lines 48-51 and col. 11, lines 4-7).” However, the Small et al. patent does not cure the deficiencies in the Hartog et al. and Kramer et al. patents discussed above.

Dependent claim 7

In addition, dependent claim 7 recites specific surfactants that are not disclosed or suggested in the Hartog et al., Kramer et al. and Small et al. references, alone and in combination. As defined in dependent claim 7, the colloidal particles include colloidal silica particles, the surfactant is a cationic quaternary amine surfactant, and the self-cleaning colloidal slurry composition has a pH of approximately 7 to 12. See, for example, the discussion at page 20, lines 2-6 of the specification. Hence, claim 7 requires a specific combination of colloidal silica particles, cationic quaternary amine surfactant, and pH. The cited art, including the Kramer et al. patent, fails to disclose or suggest a quaternary amine surfactant, alone, much less in the context of the claimed combination.

PATENT
AMENDED APPEAL BRIEF

F. Conclusion to argument

In view of the above arguments, the appellant respectfully submits that claims 1, 3-18, 35 and 40-42 are patentable over the cited art references, and the rejections thereof under 35 U.S.C. 103(a) should be reversed.

Respectfully submitted,

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PATENT
AMENDED APPEAL BRIEF

(viii) Claims appendix

- 1 1. A self-cleaning colloidal slurry composition for superfinishing a surface of a
2 substrate, the self-cleaning colloidal slurry composition comprising:
3 a carrying fluid;
4 colloidal particles;
5 etchant for etching the substrate;
6 a surfactant adsorbed and/or precipitated onto a surface of at least one of the
7 substrate and the colloidal particles, the surfactant having a hydrophobic section that
8 forms a steric hindrance barrier between the substrate and the colloidal particles,
9 wherein the substrate is selected from a group consisting of a glass disk substrate, a
10 ceramic disk substrate, and a glass-ceramic disk substrate for use in a data storage device.

- 1 3. The self-cleaning colloidal slurry composition as recited in claim 1, wherein the
2 substrate is a silicate-based glass disk substrate.

- 1 4. The self-cleaning colloidal slurry composition as recited in claim 1, wherein the
2 colloidal particles include colloidal silica particles, the surfactant is a nonionic surfactant
3 and/or cationic, and the self-cleaning colloidal slurry composition has a pH of
4 approximately 0 to 4.

PATENT
AMENDED APPEAL BRIEF

1 5. The self-cleaning colloidal slurry composition as recited in claim 4, wherein the
2 self-cleaning colloidal slurry composition has a pH of approximately 0.8 to 3.0.

1 6. The self-cleaning colloidal slurry composition as recited in claim 5, wherein the
2 self-cleaning colloidal slurry composition has a pH of approximately 1.0 to 2.0.

1 7. The self-cleaning colloidal slurry composition as recited in claim 1, wherein the
2 colloidal particles include colloidal silica particles, the surfactant is a cationic quaternary
3 amine surfactant, and the self-cleaning colloidal slurry composition has a pH of
4 approximately 7 to 12.

1 8. The self-cleaning colloidal slurry composition as recited in claim 1, wherein the
2 colloidal particles include colloidal alumina or colloidal silica coated with alumina, and
3 the self-cleaning colloidal slurry composition has a pH of approximately 3.5 to 10.5.

1 9. The self-cleaning colloidal slurry composition as recited in claim 4, wherein the
2 colloidal silica particles have a nominal size of approximately 2 - 200 nm.

PATENT
AMENDED APPEAL BRIEF

1 10. The self-cleaning colloidal slurry composition as recited in claim 6, wherein
2 the colloidal silica particles include colloidal silica spheres having a nominal size of
3 approximately 7 nm.

1 11. The self-cleaning colloidal slurry composition as recited in claim 3, wherein
2 the etchant is a metal etchant selected from a group consisting of Ce, Zr, Ti, Fe, Sn, Al,
3 Cr, Ni, Mn and Zn ions, and combinations thereof, and wherein the metal etchant is
4 present in solution and/or as a colloid and/or as an ion on the colloidal particles.

1 12. The self-cleaning colloidal slurry composition as recited in claim 11, wherein
2 the metal etchant is Ce ions.

1 13. The self-cleaning colloidal slurry composition as recited in claim 1, wherein
2 the surfactant is a nonionic and/or cationic surfactant selected from a group consisting of
3 oxygen containing compounds and nitrogen containing compounds, and combinations
4 thereof.

5 14. The self-cleaning colloidal slurry composition as recited in claim 13, wherein
6 the nonionic surfactant is an oxygen containing compound with moieties of ethylene
7 oxide and/or polyvinyl alcohol.

PATENT
AMENDED APPEAL BRIEF

1 15. The self-cleaning colloidal slurry composition as recited in claim 13, wherein
2 the nonionic and/or cationic surfactant is a nitrogen containing compound selected from a
3 group consisting of alkaloids and amines, and combinations thereof.

1 16. The self-cleaning colloidal slurry composition as recited in claim 13, wherein
2 the nonionic and/or cationic surfactant is a polydentate adsorption surfactant.

1 17. The self-cleaning colloidal slurry composition as recited in claim 1, wherein
2 the surfactant is a cationic surfactant.

1 18. The self-cleaning colloidal slurry composition as recited in claim 1, wherein
2 the surfactant is selected from a group consisting of anionic surfactants and quaternary
3 amine surfactants.

PATENT
AMENDED APPEAL BRIEF

1 35. A self-cleaning colloidal slurry composition for finishing a surface of a
2 substrate, the self-cleaning colloidal slurry composition comprising:
3 a carrying fluid;
4 colloidal particles;
5 etchant for etching the substrate;
6 a surfactant adsorbed and/or precipitated onto a surface of at least one of the
7 substrate and the colloidal particles, the surfactant having a hydrophobic section that
8 forms a steric hindrance barrier between the substrate and the colloidal particle,
9 wherein the substrate is selected from a group consisting of a glass disk substrate, a
10 ceramic disk substrate, and a glass-ceramic disk substrate for use in a data storage device,
11 and
12 wherein the colloidal particles have a nominal size of approximately 70 - 200 nm to
13 provide a textured surface on the substrate.

1 40. The self-cleaning colloidal slurry composition as recited in claim 14, wherein
2 the surfactant is an ethylene oxide propylene oxide block copolymer.

PATENT
AMENDED APPEAL BRIEF

1 41. A self-cleaning colloidal slurry composition for superfinishing a surface of a
2 substrate, the self-cleaning colloidal slurry composition comprising:
3 a carrying fluid;
4 colloidal particles;
5 etchant for etching the substrate;
6 a surfactant precipitated onto a surface of at least one of the substrate and the
7 colloidal particles, the surfactant having a hydrophobic section that forms a steric
8 hindrance barrier between the substrate and the colloidal particles,
9 wherein the substrate is selected from a group consisting of a glass disk substrate, a
10 ceramic disk substrate, and a glass-ceramic disk substrate for use in a data storage device.

1 42. The self-cleaning colloidal slurry composition as recited in claim 41, wherein
2 the surfactant is sodium octyl sulfate.

PATENT
AMENDED APPEAL BRIEF

(ix) Evidence appendix

NONE.

PATENT
AMENDED APPEAL BRIEF

(x) Related proceedings appendix

NONE.